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Child pathology in the mendicants' necropolis of El Burgo de Osma Cathedral (Soria, Spain)

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CHILD PATHOLOGY IN THE MENDICANTS' NECROPOLIS OF EL BURGO DE OSMA CATHEDRAL (SORIA, SPAIN)

PATHOLOGIE INFANTILE CHEZ LES MENDIANTS DE LA NÉCROPOLE DE LA CATHÉDRALE D'EL BURGO DE OSMA (SORIA, ESPAGNE)

M.D. GARRALDA [1], J. HERRERÍN [1], B. VANDERMEERSCH

ABSTRACT

The necropolis discovered in the Cloister of the El Burgo de Osma Cathedral (Soria, Northern Spain) consists of a group of 63 burials, with a total of 75 individuals, 55 adults, 4 youths and 16 children between 0 and 13 years old. Historical documents dating from the time when this necropolis was used (in the 17th and 18th centuries), point to this area as a cemetery for "…poor mendicants...". The study of the pathologies of this human group corroborates these data, since several of the individuals suffered from a loss of movement preventing them from carrying out any physical work. This paper focuses on the paleopathological study of three infantile skeletons, particularly interesting since they reflect the hard living conditions and/or important alterations in the development of these beggar children.

Key words: Paleopathology, Spain, modern era, trauma, rickets, myelomeningocele, dental agenesis.

RÉSUMÉ

La cathédrale de la ville d'El Burgo de Osma (Soria, Nord de la Castille) a été un centre de pèlerinage très important, du Moyen Âge au début du XIX^e^ s. Les documents historiques témoignent de la quantité de pauvres gens qui mendiaient autour de la cathédrale, dont beaucoup présentaient de graves tares physiques. Ces mêmes documents indiquent qu'une partie du cloître de la cathédrale a été utilisée comme cimetière pour ces mendiants, depuis le Moyen Âge jusqu'à la fin du XVIII^e^ s. Les fouilles archéologiques ont mis au jour une importante nécropole (75 individus : 55 adultes, 4 adolescents et 16 enfants de 0 à 13 ans) où les sujets avaient été ensevelis dans des fosses simples, souvent réutilisées, avec une absence presque totale d'objets de parure.

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L'étude anthropologique a montré que ces individus constituaient un échantillon particulier, avec un taux de pathologies très élevé, dont plusieurs très déformantes. Parmi les individus étudiés, il y a trois enfants que nous décrivons dans ce travail : l'un présente une fracture du fémur produite peu avant son décès, un autre est un cas de rachitisme et le troisième devait être un enfant très malade qui souffrait de myéloméningocèle, accompagné d'une importante dysplasie mandibulaire.

Mots-clés : *Paléopathologie, Espagne, âge moderne, traumatismes, rachitisme, myéloméningocèle, agénesie dentaire.*

INTRODUCTION

The town of El Burgo de Osma is situated in Castile (Northern Spain), in the west of the province of Soria (*fig. 1*). Because of its geographical situation, it has an extreme continental climate.

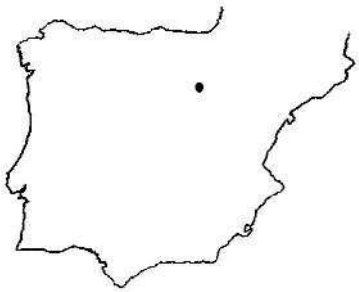

Fig. 1 - Location of the town of El Burgo de Osma, (Soria, Spain).
Fig. 1 - Localisation d'El Burgo de Osma (Soria, Espagne).

This town has a beautiful Gothic and Renaissance cathedral, which had been an important pilgrimage centre since the Middle Ages. In the 16th century cloister of this cathedral, important archaeological excavations (Tarancón *et al.*, 1994) were carried out in the area known as "Paso de Animas" (Passage of Souls), as it corresponded to the stretch that led to the cemetery.

A total of about 63 burials were discovered, the corpses laid in a supine position with their arms folded over their chests or waists, and their legs straight. Most burials correspond to simple deposits, with no structure, although a group of 16 inhumations were also found in the same grave (Tarancón *et al.*, 1994). The orientation of these burials does not present a common disposition in all cases, since some of the individuals were in the west-east position (head-feet), other in the south-north, whereas the majority of them were east-west orientated.

According to the archaeologists (Tarancón *et al.*, 1994), the personal adornments associated with the buried individuals were few, mainly consisting of two rings and an earring of little value. This fact coincides with the bibliographical references indicating that this cemetery was destined to bury "the poor" and/or "the poor mendicants". There is a remarkable biographical documentation from the first quarter of the 18th c. (López de Quirós, 1724), reaffirmed at the end of this same century (Loperráez, 1788), that associated this area with the cemetery for the mendicants, placing its beginning in the 17th c. We know from other documents that it was used until the late 18th c., when the present cemeteries were established.

Living conditions in this small Castilian town must have been very hard indeed, as shown by the population census during the 17th and 18th c., which refers to the existing poverty in the following terms: "We must sadly mention the high number of poor people" who busy themselves begging in the village. For example, in a 1746 neighbourhood, and out of a total of 207 "pecheros" (neighbours obliged to pay taxes), "76 poor people, including widows" are registered, out of which 6 were declared as "pobres de solemnidad" (extremely poor) (Alonso Romero, 1997). There is also a remarkable Municipal Order of 24 March 1666, showing the authorities´ efforts to put an end to the "great amount of people who are begging from door to door" by demanding from those who wanted to beg a proof of the handicaps which left them unfit to work and earn their living (Alonso Romero, 2001).

During the 17th and 18th c., El Burgo de Osma suffered several periods of famine. Apparently the worst period took place between 1628 and 1640, when there was a great drought throughout Castile. Besides, the War of Succession left its mark on this land, causing the neglect of farms and the resulting shortage of food supplies. To all these problems, we must add the four typhus epidemics suffered by the village over two hundred years (Alonso Romero, 1997).

Recent research on this necropolis (Herrerín, 2000) identified numerous cases of different pathologies, some of which were very serious, preventing the affected individuals from carrying out any normal working activities. These pathologies seem to confirm the use of the Cloister's necropolis as the burial place for the mendicants who begged in the boundaries of this religious building, as also described by the village chroniclers (López de Quirós, 1724; Loperráez, 1788). According to numerous documents and the literature of those centuries, many of these beggars exhibited their poverty and their serious physical handicaps to move the faithful to pity, which was in fact their way to fight for survival. Moreover, as nowadays, some of them used their own children, suffering from various illnesses or severe malformations, to obtain more generous alms.

The remains of Saint Peter of Osma lie in the cathedral. He was a French Clunian monk from Bourges, a Patron Saint of the diocese and founder bishop of the El Burgo

de Osma Episcopal Holy See in 1101. On both sides of the magnificent 13th c. tomb appear several of the miracles attributed to him, consisting of the healing of sick people by means of his intercession. The Saint´s fame spread rapidly, and people suffering from diseases or physical handicaps went there to pray. At this point we must remember that after the *Rescripto* of the Archbishop of Toledo in the 12th c., Osma was considered as a pilgrimage centre (Alonso Romero, 1986). On the right side of Saint Peter's tomb there is a relief of a row of seated people, displaying their physical handicaps and waiting and praying for a miraculous cure.

These reliefs of fifteen supplicants, eleven adults and four children of different ages, show their deformities in an almost exhibitionist attitude, as if to explain not only their reasons for begging for the Saint´s intercession, but to show their physical handicaps and their precarious state of health in order to move the observers and therefore to receive their help or their alms. Three of these children appear to be newborn babies, and one appears to be about seven or eight years old.

Although paleopathological studies on adults are usually focused on their slowly progressive and long-lasting traumas and chronic diseases, which normally include infections, arthritis and dental diseases that leaving marks on their bones throughout life, pathological studies on young children focus, principally, on the congenital pathologies that affected these children, the localized traumas that left their marks on the affected bone, and the metabolic diseases that caused a lack of mineralization of the bone tissue and the consequent deformity of the bone.

Considering the relative lack of sensibility of the bone tissue to numerous diseases (Ortner *et al.*, 1992), and the low frequency of many conditions affecting the skeleton on human groups (Aufderheide, Rodríguez-Martín, 1998), these limitations increase considerably in studies of children, since the short duration of their lives prevents, in many cases, the involvement of bone tissue in the pathology, which very often goes undetected when their skeletons are examined.

A good example of these difficulties is provided by the fact that it is impossible to detect in this series exhumed in the Cloister's necropolis the expected high number of deaths caused by the aforementioned typhus epidemics. The individuals of this special group were in all probability prone to contracting the disease. Dirt, hunger and poverty must have certainly been present in their lives, especially in those years of general shortage. Consequently these children, unprotected and vulnerable, must have endured much suffering, and infant mortality must have been very high.

In verifying cases of bone pathologies at early ages and in such a small group of children (16 individuals), we can add new evidence to confirm the historical data about the use of these quarters as a place for the selective burials of a small community of beggars. So we will describe the injuries discovered in three immature skeletons,

belonging to different age groups: an infant (between 0 and 1 year old); a child between 2.5 and 3.5 years old, and a third aged around 8 or 9 years. The aethiology of their diseases seems to be different in each particular case: a trauma, a metabolic disease and a congenital pathology.

"GREEN STICK" FRACTURED FEMUR ON A BABY

The child skeleton number 4-1 was found next to individuals 4 and 5 in Sector III of the necropolis. It is represented by the two hemifrontals, part of the right temporal and both parietals, the incomplete left zygomatic, as well as the basilar and lateral portions of the occipital. From the postcranial bones, the left clavicle, a part of the right scapula, the left pubis, both humeri and radiuses, the right ulna and the two femora were found. The whole recovered skeleton (including the left femur) did not showed signs of any pathology, except for the bone that we shall describe. The child was about 60 cm. tall and his estimated age was nearly one year (between 337 and 356 days), according to the method of Fakezas and Kósa (1978). If we take the scales of Alduc-Le Bagousse (1988) and Saunders *et al.* (1993) as a reference, the estimation lies between 7 and 9 months of age.

The child's right femur presents a sharp fracture of the dorsal side of the distal diaphyseal third, showing a beginning of bone regeneration and an incipient formation of callus on both lateral sides. (*fig. 2*, *3*). The baby died before the fracture was totally knitted together, because the lesion was in a process of formation called primary callus, which normally starts in the first week after the trauma is suffered and takes about six weeks to form (Ortner, Puschar, 1985), although this period can be shorter or longer depending on individual age, type of lesion, state of health and diet, among some other factors (Collins, 1966). Considering this, we can presume that the fracture must have happened between one and three weeks before death.

These kinds of fractures occur when the bone has undergone a strong bending pressure or torsion ("bending fractures"; Ortner, Putschar, 1985), when the bone has been bent by a fall, or as a reaction to an impact. As a consequence of the low degree of mineralization on children and young adult bones, the trauma can produce an incomplete transversal fracture known as "green stick fracture". On adults this type of lesion does not occur, especially on long bones, although some cases have been described on ribs (Buikstra, Ubelaker, 1994). The child (between 7 months and one year) was too young to walk, and therefore it seems obvious to think that it was caused by a sharp blow very near his knee, the leg being twisted in the opposite direction to the knee articulation, but we cannot conclude whether it was a traumatic accident (was the child beaten?) or a deliberate lesion, inflicted in order to handicap the child and move people to pity.

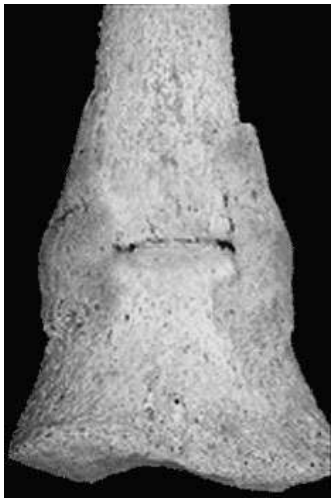

Fig. 2 - El Burgo de Osma. Child 4-1: fracture on dorsal side of the right femur.

Fig. 2 - El Burgo de Osma. Enfant 4-1 : fracture sur la face dorsale du fémur droit.

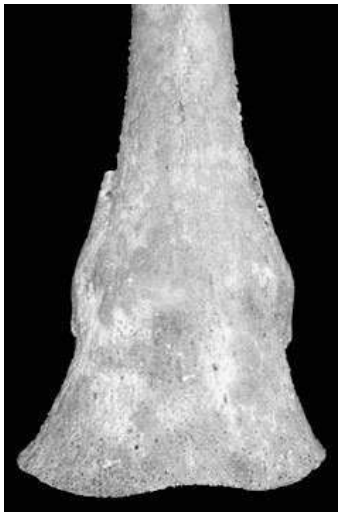

Fig 3 - El Burgo de Osma. Child 4-1: right femur, anterior side.

Fig 3 - El Burgo de Osma. Enfant 4-1 : face antérieure du fémur droit.

RICKETS IN A CHILD AGED BETWEEN 2.5 AND 3.5 YEARS

Individual number 52, discovered in Sector IV of the Cloister's necropolis, was found inside a simple grave; the corpse was east-west orientated, lying in a supine position with his arms folded over his waist and his legs straight. The three bones belonging to each innominate (ilium, pubis and ischium), the right humerus (very damaged), the two femora and part of the left scapula were recovered.

His age at death was calculated according to the scales of Alduc-Le Bagousse (1988) and Saunders *et al.* (1993), and was estimated between 2.5 and 3.5 years from the dimensions of the pelvic bones, since the femora and the humerus were incomplete. Neither the cranium nor any of the ribs were found.

Among the remains of this child we identified some signs of rickets in both femora, which present a deep front, back and lateral bending of the diaphysis, as seen in figure 4. Even though the tibias and fibulas were not found, we can presume that his legs were probably very bent. Normally, a child starts to walk at an age that ranges between one year and one year and a half. The estimated age (between 2.5 and 3.5 years old) indicates that, in normal circumstances, walking must have occurred during a period that was not inferior to one year. The body weight would have been enough to exaggerate the normal curvature of his femurs, tibias and fibulas in case of avitaminosis. The head absence could be probably due to the fragility and thinness, characterizing the cranium of children affected by rickets, making its preservation difficult.

Fig. 4 - El Burgo de Osma. Child 52: femora deformed by rickets.

Fig. 4 - El Burgo de Osma. Enfant 52 : fémurs déformés par le rachitisme.

The described child fits perfectly into the profile identified for the avitaminosis D, since it occurs within the "maximum risk age period" in which this disease is suffered (between 6 months and 5 years of age, and hardly ever develops in children over 4 years of age; Stuart-Macadam, 1989). Due to its geographical situation, El Burgo de Osma enjoys long periods of sunshine all through the year, and therefore we may suppose that the existence of cases of rickets in this necropolis would probably have been caused by a lack of vitamin D or its precursors (especially vitamin D2, an ergosterol of vegetal origin that is present in cereals) in the diet of this low social group, especially during the periods of droughts and poor harvest seasons.

MALFORMATIVE OSSEOUS DYSPLASIAS IN A CHILD AGED BETWEEN 8 AND 9 YEARS

Individual number 41 also comes from Sector IV of the Cloister's necropolis, where it was found inside a single grave, in a supine position. From his cranial skeleton some parts of his cranium (frontal, occipital, both parietals, right temporal and left zygomatic bone) and the mandible were found. The right humerus, both ulnae and radiuses, as well as the scapular and pelvic girdles (except both pubis) were also recovered. The vertebral column was almost completely preserved, as well as the ribs, whereas from the lower limbs only the two femurs remained. Radiographs showed no evidence of Harris lines.

Age estimation, according to the scale of Moorrees *et al.* (1963a, b), Anderson *et al.* (1976) and Ubelaker (1978) for teeth formation and eruption sequence, is approximately 10 years ± 30 months. By using the length and the perimeter of the femur according to the scale of Alduc-Le Bagousse (1988) this estimation lies between 8 and 9 years old. If we take as a reference the closure of the neural arches of the cervical vertebrae (they all have a closed arch, except for the atlas, which is divided in two), the estimation would then lie between 7 and 9 years of age (Bass, 1987; Spalteholz, 1992; Scheuer, Black, 2000). The child´s height, as calculated from the maximum femoral length according to the scale of Olivier (1960) was 123 cm. This estimation seems to be slightly high if we compare it to the values known for low social class Spanish children (of similar age) measured at the end of 19th c. and beginning of the 20th c. (Marrodán *et al.*, 1998), and it seems probably that this difference could be related to methodological problems on juvenile stature estimation.

The cranium of this child presents some of the characteristics that are typical in cases of hydrocephaly (El-Najjar, McWilliams, 1978; Aufderheide, Rodríguez-Martín, 1998). Neurocranium bones (*fig. 5*) are very thin and translucent; the frontal bones are

prominent and projected, causing the frontal protuberances to practically disappear, and his face was small in proportion to the rest of the cranium. The vault's inner surface (*fig. 6*), especially the frontal, temporal and parietal bones, presented some digital-shaped prints caused by an abnormal intracranial pressure. Moreover, the impression of the arteries on the endocranium formed very deep tracks, much deeper than the normal sulcus.

Fig. 5 - El Burgo de Osma. Child 41: cranium, lateral view.
Fig. 5 - El Burgo de Osma. Enfant 41 : vue latérale du crâne.

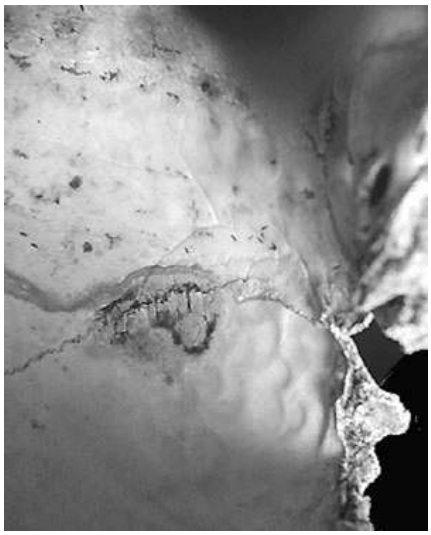

Fig. 6 - El Burgo de Osma. Child 41: digital impressions on the endocranium.
Fig. 6 - El Burgo de Osma. Enfant 41 : impressions digitales sur l'endocrâne.

All these symptoms lead us to a diagnosis of hydrocephaly, although the cranium is not as spectacularly widened as in other cases described (Vallois, 1971; Spitery, 1983; Richard, Anton, 1991). Nevertheless, when hydrocephaly develops in prepubescent children, it might not result in an appreciable expansion of the cranium. We must therefore search for marks on the endocranium (that which is called inner hydrocephaly), narrowness in the cranial bones and digital-shaped prints on the vault's inner side (Aufderheide, Rodríguez-Martín, 1998), as in the case of the studied child.

This child also presents a clear opening of the back apex of the neural canal in the fifth lumbar vertebra, and his sacral canal is totally open in the four sacral vertebras preserved (*fig. 7*). That leads us to diagnose a *spina bifida aperta*, which, together with the hydrocephaly, presents a clear manifestation of myelomeningocele. Even though the appearance of such a disease usually causes death at a very early age, sometimes before the age of 6 (Dastuge, Gervais, 1992), it is not uncommon to find affected individuals who have gone beyond this age, although they rarely reach adulthood.

Spina bifida or *rachischisis* is the most common congenital defect affecting the vertebral column (Mann, Murphy, 1991). Many cases occur in the lumbar-sacral region of the spine, especially in the sacrum, and they are less frequent in other regions. *Spina bifida aperta* or *cystica* is a severe pathology, sometimes lethal when it occurs at a very early age. It has three degrees of severity. The most common among them (60% of the cases; Aufderheide, Rodríguez-Martín, 1998), occurring more frequently in the lumbar-sacral region, is the identified myelomeningocele, in which the spinal cord, together with the meninges, are placed completely outside the open arch.

This grave congenital pathology is not the only one affecting child number 42, as another important osseous dysplasia has been identified in the mandible.

The mandible of this child is also highly pathological and very asymmetrical; the right ascending ramus is larger and more angular than that of the left side, and the mandibular body is clearly lower on the pathological right side (*fig. 8*).

The infant's mandible reveals the presence of a normal *canalis mandibulae* on the left side, whereas it does not exist on the right side and the mylohyoideus wrinkle is more deeply marked. The right *foramen mandibulae*, on the right side, appears as a closed cavity in the mandible body, where neither the artery, the vein nor the dental nerve go through. The corresponding *lingula mandibulae*, which limits the dental canal in its front side, is large and formed a short external canal through which the veins and nerves might have passed. The right *foramen mentale* (*fig. 8*) is also absent.

The teeth present in the mandible (*fig. 9*) were I1, m2 and M1 on the left side; i2 and c were *post-mortem* loss. The lateral radiographies of the mandible show that the germs of C, P4 and M2 on the left side were in formation, but the roots of m2 were not yet reabsorbed. The left m1 was lost before the child's death, probably destroyed by

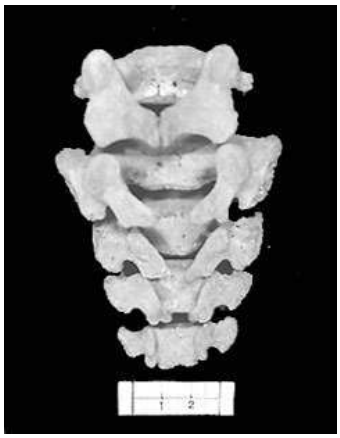

Fig. 7 - El Burgo de Osma. Child 41: spina bifida aperta.
Fig. 7 - El Burgo de Osma. Enfant 41 : spina bifida aperta.

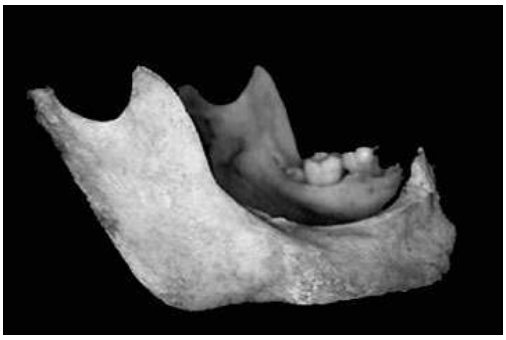

Fig. 8 - El Burgo de Osma. Child 41: mandible, right lateral view. Absence of foramen mentale.
Fig. 8 - El Burgo de Osma. Enfant 41 : mandibule, vue latérale droite. Absence de foramen mentale.

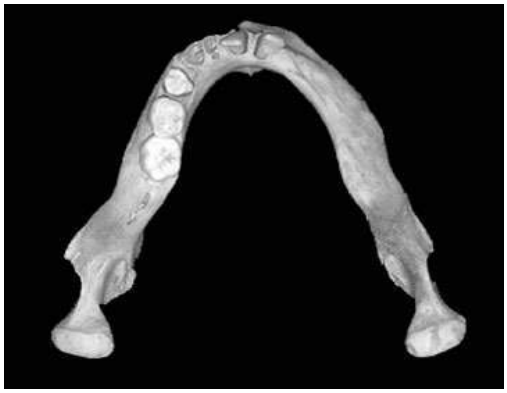

Fig. 9 - El Burgo de Osma. Child 41: occlusal view of the mandible.
Fig. 9 - El Burgo de Osma. Enfant 41 : mandibule, vue supérieure.

caries, and the alveolus is deformed, also showing traces of infection and causing the loss of P3 crown. An initial caries appears on the mesial face of the m2. On the right side no dental germ was observed, and there was no sign of teeth formation or eruption, with the exception of I1.

The preserved teeth did not presented traces of hypoplasia, but both incisors show a tartar band on the buccal and lingual sides. The m2 has severe attrition, while M1 and both central incisors have only slight traces of abrasion, indicating that a short period of time had passed between their eruption and the individual's death. Due to the absence of the upper maxillary it is not possible to know whether the upper and lower teeth produced a normal occlusion.

Thus this child suffered a grave pathology, accompanied by another important dysplasia, which altered the mandibular and, very probably, facial morphology. As previously described, the congenital absence of both foramina (*mandibulae* and *mentale*) on the right side prevents the mandibular veins and nerves from penetrating into the horizontal ramus, causing the agenesia of the teeth, with the exception of I1, probably irrigated from the left side. Thus we consider the congenital agenesia of this *foramen mentale* and the impossibility of developing the *plexus dentalis mandibularis*, to have been the direct cause for the absence of teeth on the right half mandible, with the exception of I1.

We found few references to similar cases in the consulted bibliography. Jakobsen *et al.* (1991) described that of an adult woman (about 30 years old), from a medieval Danish town, with a mandible missing the right *foramen mandibulae* and its corresponding mandibular canal, and therefore, a unilateral absence of the *plexus dentalis mandibularis*. The *foramen mentale* on the right side has been described by the authors as "a bone depression with a slight entrance canal on its depressed area", while the left part had a normal foramen. It is interesting to notice that on the lingual surface of the mandible, Jakobsen *et al.* (1991) observed a "well developed entrance canal or orifice", which opened laterally and downwards to the apophysis geni. As a result, dental development of the teeth on this side did not occur, even though the mylohyoideus nerve partially compensated this defect, nerving and allowing the growth of the anterior right teeth (incisors, canine and first premolar). These authors also noted that the mandible was "very asymmetrical", presenting a masseterical swelling in the shape of a "wall" on the right side of the ramus, which in their opinion, could have acted as a "structure of mechanical compensation".

In child 41 from El Burgo de Osma Cathedral, only the central incisor on the right side had developed, probably nerved from the left hemimandible. No extra orifice, through which the mylohyoideus nerve could have penetrated inside the horizontal ramus was observed, neither in the genian area, nor on the other half of the jaw. It is also noticeable that the chin nerve (*nervus mentalis*), which normally emerges from the

mandible through the *foramen mentale*, does not in this case. Therefore the child could have lacked that nerve, and would have consequently suffered from the absence of nerving in the chin tissues and the skin and mucous membrane of the lower lip.

Moreover, as previously indicated, an important mandibular asymmetry can be seen in figure 8, displaying a higher growth on the left side, just where the teeth had developed. It seems as if the mandible had adapted itself to the stronger chewing pressure on the normally developed half, thus causing a displacement of the bone mass towards this side. Contrary to other studied cases of mandibles with teeth agenesis (Jakobsen *et al.*, 1991), no bone ledge was formed to counteract the non-symmetrical chewing, possibly because of the child's early age, but the jaw developed asymmetrically, due to unilateral chewing.

CONCLUSIONS

This paper describes three cases of child paleopathology identified in the series exhumed from the Cloister necropolis at El Burgo de Osma Cathedral (Soria). As described, numerous documents indicate the use of this area to bury the many beggars living around the cathedral.

The first described pathology is a trauma, a "green stick fracture" of the right femur of baby number 4-1 (sector III; ≈ 7/9 months). We do not know whether this trauma was related to the child's death, having occurred a short time before it, nor whether it was accidentally or intentionally caused. Historical and literary documents indicate mutilations of children to elicit pity in many different societies throughout history.

The second case is that of child number 54 (≈ 2,5/3,5 years) with rickets which curved and deformed both femora. We interpreted this to be related to environmental conditions, and probably linked to nutritional deficiencies.

The third child (nº 41; aged ≈ 8 years) is polymalformed, suffering from hydrocephaly and *spina bifida aperta*, which we interpreted as a case of myelomeningocele. Another important dysplasia affected the mandible, where the absence of the foramina (*mandibulae* and *mentale*) caused dental agenesia of the teeth on the right side, with the exception of I1, which probably had a nerve running from the left hemimandible. Consequently the mandible and the face of this child, who was probably mentally deficient, would have been deformed and partially paralysed.

These children suffered important pathologies, of very different aethiology, reflecting and confirming the difficult living conditions of the mendicant human group buried in the necropolis.

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